

Challenging practice for AT2

Name:

Formula List

For the equation $ax^2 + bx + c = 0$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Curved surface area, A , of cylinder of radius r , height h .
$$A = 2\pi rh$$

Curved surface area, A , of cone of radius r , sloping edge l .
$$A = \pi rl$$

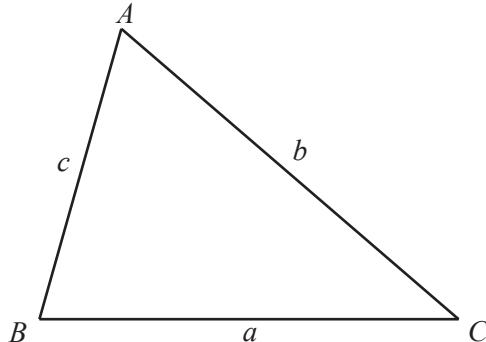
Curved surface area, A , of sphere of radius r .
$$A = 4\pi r^2$$

Volume, V , of pyramid, base area A , height h .
$$V = \frac{1}{3}Ah$$

Volume, V , of cylinder of radius r , height h .
$$V = \pi r^2 h$$

Volume, V , of cone of radius r , height h .
$$V = \frac{1}{3}\pi r^2 h$$

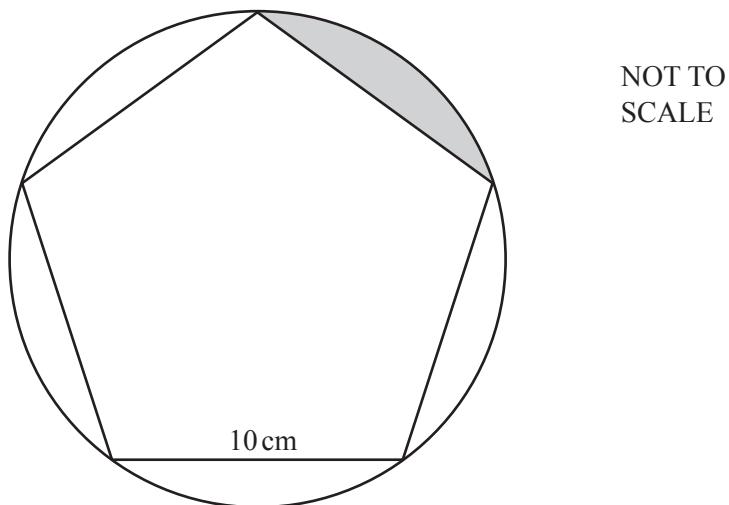
Volume, V , of sphere of radius r .
$$V = \frac{4}{3}\pi r^3$$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area} = \frac{1}{2}bc \sin A$$



The diagram shows a regular pentagon, of side 10 cm, with its vertices lying on a circle.

(a) Show that the radius of the circle is 8.51 cm, correct to 3 significant figures.

[4]

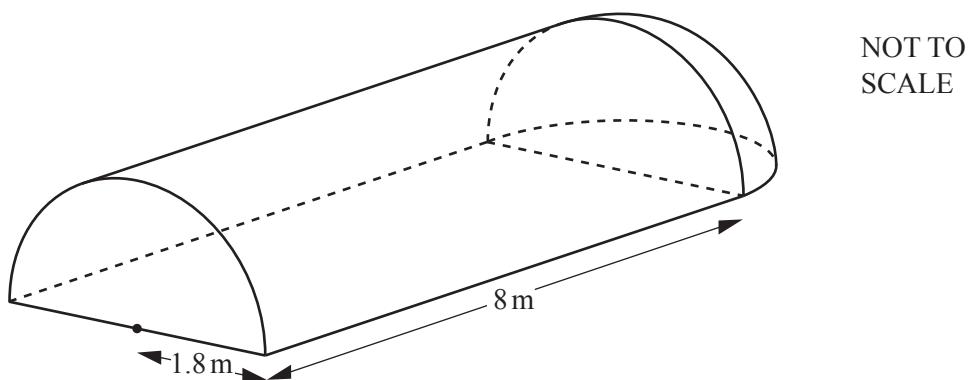
(b) Calculate

(i) the perimeter of the shaded segment,

..... cm [3]

(ii) the area of the shaded segment.

..... cm^2 [3]



The diagram shows a polythene structure in which a farmer grows vegetables. The structure consists of a prism with a quarter of a sphere at **one** end. The cross-section of the prism is a semicircle.

The semicircle has a radius of 1.8 m and the length of the prism is 8 m.

(a) Calculate the volume of the structure.

..... m^3 [3]

(b) The curved surface of the prism and the two ends of the structure are made of polythene.

Calculate the area of the polythene.

..... m^2 [4]

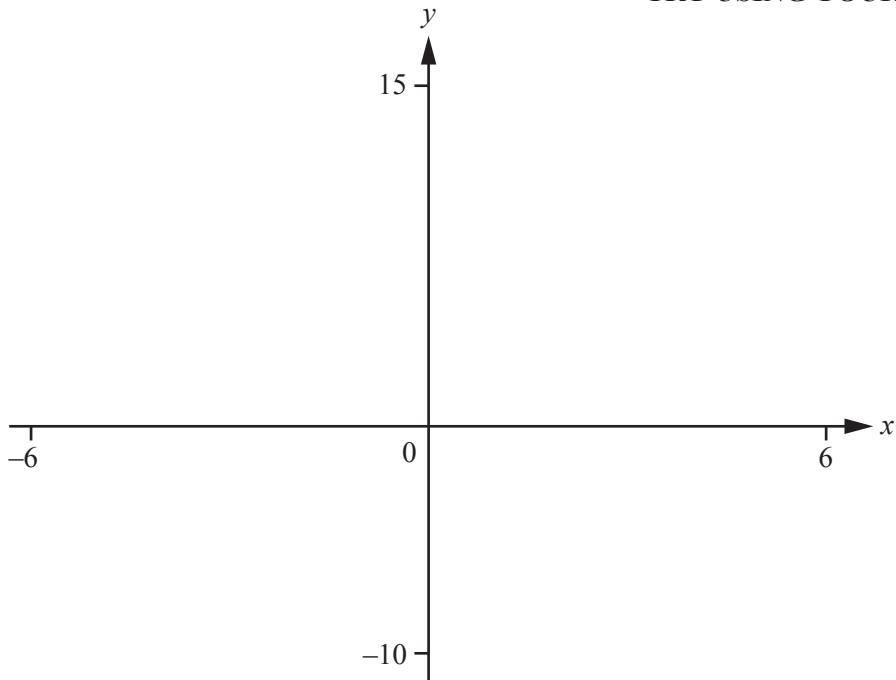
14 A is the point $(1, 9)$ and B is the point $(7, 1)$.

(a) Find the length of AB .

..... [3]

(b) Find the co-ordinates of the midpoint of AB .

(.....,)[2]



$$f(x) = \frac{(2x-3)}{(x+2)}$$

(a) On the diagram, sketch the graph of $y = f(x)$ for values of x between -6 and 6 . [3]

(b) Write down the equations of the asymptotes of $y = f(x)$.

.....

..... [2]

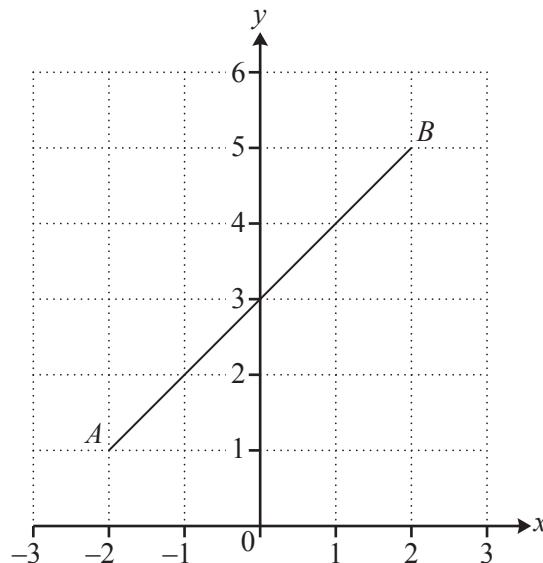
(c) $g(x) = 5 - 2x$

(i) Solve $f(x) = g(x)$.

PLOT BOTH AND SEE WHERE THEY CROSS

$x = \dots$ or $x = \dots$ [2]

14 The line AB is drawn on a 1 cm^2 grid.



(a) Write down the co-ordinates of the midpoint of AB .

(.....,)[1]

(b) Use Pythagoras' Theorem to work out the length of AB .

$AB = \dots$ cm [2]

(c) Work out the gradient of AB .

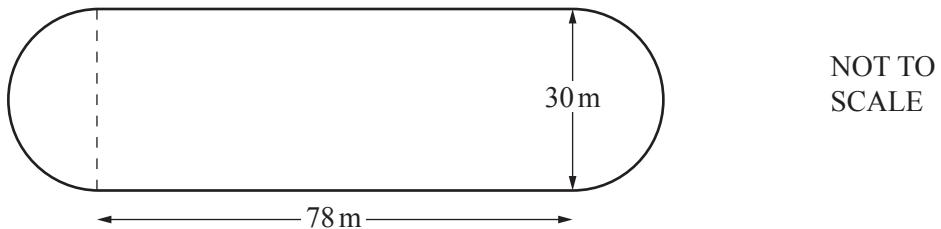
..... [2]

(d) Write down the equation of AB in the form $y = mx + c$.

$y = \dots$ [2]

Question 15 is printed on the next page.

10 A cycle track has two straight sections, each 78 m long. Each of the two semi-circular ends has diameter 30 m.



Work out the perimeter of the cycle track.

..... m [3]

11 (a) Factorise.

$$5x - 15$$

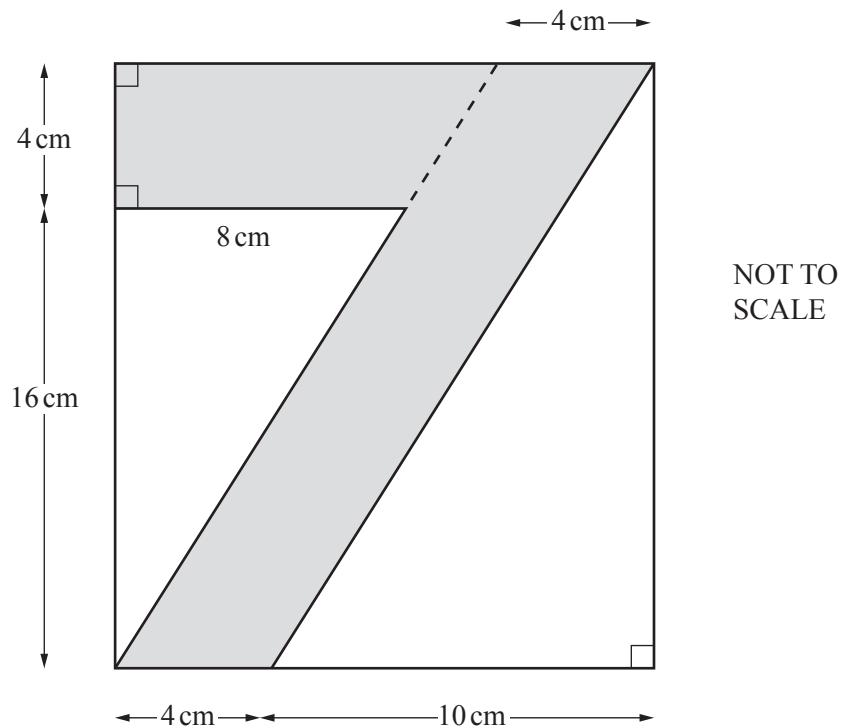
..... [1]

(b) Solve.

$$4(3x - 2) = 28$$

..... [3]

6 The number 7 is drawn on a rectangular piece of paper.



(a) Work out the area of the rectangular piece of paper.

..... cm² [2]

(b) Work out the total area of the shaded number 7.

..... cm² [4]

4 (a) Write in figures the number seven thousand and sixty one.

..... [1]

(b) Write down

(i) a multiple of 9,

..... [1]

(ii) an even number between 21 and 29.

..... [1]

(c) Find the value of

(i) $\sqrt{625}$,

..... [1]

(ii) 11^3 ,

..... [1]

(iii) $5^2 - \sqrt[3]{729}$.

..... [1]

(d) Insert one pair of brackets to make this calculation correct.

$$3 \times 6 + 5 - 4 = 29$$

[1]

(e) Work out.

$$\frac{25.2}{6.1 + 3.8}$$

Write your answer correct to two decimal places.

..... [2]

(f) Write 0.031 626

(i) correct to three significant figures,

..... [1]

14 Point A has co-ordinates $(2, 3)$. Point B has co-ordinates $(4, 11)$.

Find the equation of the line AB .

Give your answer in the form $y = mx + c$.

$$y = \dots \quad [3]$$

15 Expand the brackets and simplify.

$$(3x - 5y)(5x - 3y)$$

$$\dots \quad [3]$$

$$\dots \quad [3]$$

Questions 17 and 18 are printed on the next page.

17 Factorise.

$$4x^2 - 4xy - 3y^2$$

..... [3]

18 Write as a single fraction in its simplest form.

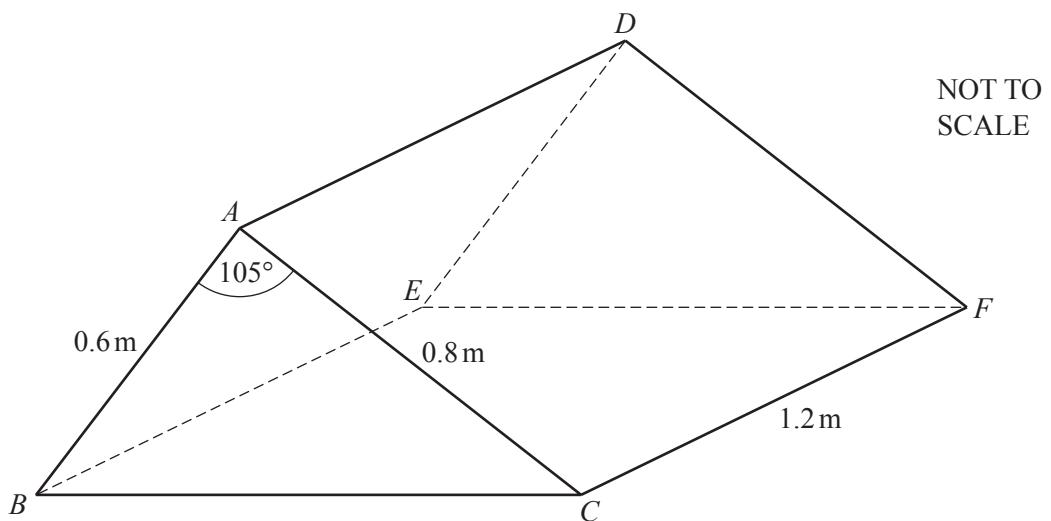
$$\frac{n+1}{n-1} - \frac{n-1}{n+1}$$

..... [4]

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$ABCDEF$ is a solid triangular prism.

(a) Calculate the volume of the prism.

..... m^3 [3]

(b) Calculate the total surface area of the prism.

..... m^2 [5]